**Comparison of various software development models:**

Software Development Life Cycle (SDLC) is a process used by the software industry to design, develop and test high quality softwares. The SDLC aims to produce a high-quality software that meets or exceeds customer expectations, reaches completion within times and cost estimates.

SDLC is a process followed for a software project, within a software organization. It consists of a detailed plan describing how to develop, maintain, replace and alter or enhance specific software. The life cycle defines a methodology for improving the quality of software and the overall development process.

There are various software development life cycle models defined and designed which are followed during the software development process. These models are also referred as Software Development Process Models. Each process model follows a Series of steps unique to its type to ensure success in the process of software development.

Following are the most important and popular SDLC models followed in the industry.

1. [**Waterfall Model**](https://www.javatpoint.com/software-engineering-waterfall-model)**:**

The waterfall model is a continuous software development model in which development is seen as flowing steadily downwards (like a waterfall) through the steps of requirements analysis, design, implementation, testing (validation), integration, and maintenance.

This model is suitable when the requirements are very well documented, clear and fixed.

1. **Rapid Application Development (RAD):**

Rapid Application Development process is an adoption of the waterfall model; it targets developing software in a short period. The RAD model is based on the concept that a better system can be developed in lesser time by using focus groups to gather system requirements.

In the RAD model, the functional modules are developed in parallel as prototypes and are integrated to make the complete product for faster product delivery. Since there is no detailed preplanning, it makes it easier to incorporate the changes within the development process.

RAD projects follow iterative and incremental model and have small teams comprising of developers, domain experts, customer representatives and other IT resources working progressively on their component or prototype.

The most important aspect for this model to be successful is to make sure that the prototypes developed are reusable.

1. **Spiral Model:**

The spiral model is a **risk-driven process model**. This SDLC model helps the group to adopt elements of one or more process models like a waterfall, incremental, waterfall, etc. The spiral technique is a combination of rapid prototyping and concurrency in design and development activities.

Each cycle in the spiral begins with the identification of objectives for that cycle, the different alternatives that are possible for achieving the goals, and the constraints that exist. This is the first quadrant of the cycle (upper-left quadrant).

The next step in the cycle is to evaluate these different alternatives based on the objectives and constraints. The focus of evaluation in this step is based on the risk perception for the project.

The next step is to develop strategies that solve uncertainties and risks. This step may involve activities such as benchmarking, simulation, and prototyping.

1. **V-Model:**

This model is the variation of waterfall model which more emphasized on testing. It’s a sequential model each phase must be completed before next phase begins. It provides simple and easy to follow map of the software development process.

V model can be used for small to medium size projects where requirements are clearly defined and fixed. It can choose when ample technical resources are available and with needed technical expertise.

1. **Incremental Model:**

The incremental model is not a separate model. It is necessarily a series of waterfall cycles. The requirements are divided into groups at the start of the project. For each group, the SDLC model is followed to develop software. The SDLC process is repeated, with each release adding more functionality until all requirements are met. In this method, each cycle act as the maintenance phase for the previous software release. Modification to the incremental model allows development cycles to overlap. After that subsequent cycle may begin before the previous cycle is complete.

1. [**Iterative Model**](https://www.javatpoint.com/software-engineering-iterative-model)**:**

It is a particular implementation of a software development life cycle that focuses on an initial, simplified implementation, which then progressively gains more complexity and a broader feature set until the final system is complete. In short, iterative development is a way of breaking down the software development of a large application into smaller pieces.

1. [**Big Bang Model**](https://www.javatpoint.com/software-engineering-big-bang-model)

Big bang model is focusing on all types of resources in software development and coding, with no or very little planning. The requirements are understood and implemented when they come.

This model works best for small projects with smaller size development team which are working together. It is also useful for academic software development projects. It is an ideal model where requirements are either unknown or final release date is not given.

1. [**Prototype Model**](https://www.javatpoint.com/software-engineering-prototype-model)**:**

The prototyping model starts with the requirements gathering. The developer and the user meet and define the purpose of the software, identify the needs, etc.

A '**quick design**' is then created. This design focuses on those aspects of the software that will be visible to the user. It then leads to the development of a prototype. The customer then checks the prototype, and any modifications or changes that are needed are made to the prototype.

Looping takes place in this step, and better versions of the prototype are created. These are continuously shown to the user so that any new changes can be updated in the prototype. This process continue until the customer is satisfied with the system. Once a user is satisfied, the prototype is converted to the actual system with all considerations for quality and security.

1. [**Agile Model**](https://www.javatpoint.com/software-engineering-agile-model)**:**

Agile methodology is a practice which promotes continues interaction of development and testing during the SDLC process of any project. In the Agile method, the entire project is divided into small incremental builds. All of these builds are provided in iterations, and each iteration lasts from one to three weeks.

Agile methods break tasks into smaller iterations, or parts do not directly involve long term planning. The project scope and requirements are laid down at the beginning of the development process. Plans regarding the number of iterations, the duration and the scope of each iteration are clearly defined in advance.

Each iteration is considered as a short time "frame" in the agile process model, which typically lasts from one to four weeks. The division of the entire project into smaller parts helps to minimize the project risk and to reduce the overall project delivery time requirements. Each iteration involves a team working through a full software development life cycle including planning, requirements analysis, design, coding, and testing before a working product is demonstrated to the client.